fact that the zero of altitude does not correspond with the axis of collimation of the telescope. This displacement of the zero line has been necessitated by the desire to make the instrument available for the measurement of differences of altitude amounting to 30°, and to get the resulting displacement for such elevation it was necessary to use more than the semidiameter of the field. The author discusses the amount of error likely to arise from this cause and puts the result in a tabular form. Very full descriptions of the method of adjustment are given and some very practical remarks are made on the method of using the apparatus.

To judge by the examples that the author has given, the instrument should prove very useful in the hands of an expert. These examples show that in the measurement of a distance of 250 m. an error of about 0·6 m. may be apparent, while the average error in elevation over the same distance, and in which the variation of level amounts to about ± 7°, will amount to a few centimetres.

OUR BOOK SHELF.

Results of Meteorological Observations made at the Radcliffe Observatory, Oxford, in the eight years 1892–99. Edited by Arthur A. Rambaut, M.A. (Dubl. and Oxon.), Sc.D., F.R.S., Radcliffe Observer. Vol. xlviii. Pp. xxiv + 245. (Oxford: J. Parker, 1901.)

THE publication of a collection of meteorological observations made in 1892 may at first sight appear somewhat belated, and as giving promise of but little interest. But observations such as the greater part of those contained in this volume serve two purposes. There is first of all the immediate application of knowledge concerning the atmospheric variations whose usefulness is shown in weather prediction and similar purposes. Some may think that this is the main, if not the only, outcome of meteorological inquiry. But, apart from all ephemeral interests, the maintenance of a continuous record of the behaviour of the atmosphere is of great importance. The study of climatic oscillations throughout long periods is a study that is likely to be attended with great advantage and instruction. The long, costly and laborious series of observations, that are so carefully prosecuted at so many stations, can only be justified by their use in investigations which aim at the primary causes of atmospheric disturbance. The records of the Radcliffe Observatory hold a deservedly high place in such series, both for accuracy and for length of time during which they have been uninterruptedly pursued, and for the purposes of scientific meteorology the value of the present volume is undiminished by the length of time that separates us from the earlier observations. It will take its place among many worthy companions and hand on the history of the variation of climate to those who have the skill to read it.

A feature of great additional interest is given to the present volume by an inquiry into underground temperatures at various depths by means of platinum-resistance thermometers. This inquiry was originated under the direction of the late Mr. E. J. Stone, and has been vigorously prosecuted by the present director. The thermometers are placed at depths varying from six inches to ten feet; a greater depth, which was originally contemplated, being found impracticable owing to the presence of water in the soil. The present inquiry is limited, but precise. It concerns itself with the variation of temperature in dry gravel; and the thermal conductivity of a water-logged stratum, or of one greatly differing in constitution from that here investigated, does not come into consideration. The main conclusion to which the Radcliffe Observer is led in this investigation into the physics of the earth's crust is, that the annual variation of temperature is reduced to 0°·1 F. at a depth of 45·3 English feet, and to 0°·01 F. at 66 English feet. The semi-annual wave has the same limits at 21·4 and 36 feet, respectively. The temperature curves for the separate months of the year on which this result is based are shown graphically in a plate possessing many features of interest.

But of equal, if not of greater, importance is the inquiry into the accuracy of the thermometers themselves and their suitability for such investigations. One gathers that although very considerable difficulty was experienced at the outset, and not unnaturally with a novel kind of apparatus, these thermometers have stood the test with great satisfaction and proved themselves more trustworthy and more convenient than the long-stemmed spirit thermometers ordinarily employed in similar researches, and against which some obvious objections can be urged The main difficulty in the use of the platinum-resistance thermometer seems to arise from a damp atmosphere affecting the connecting wires and impairing the insulation, but with sufficient precaution the recording apparatus is most sensitive and permanent.

The Telephone System of the British Post Office. By T. E. Herbert. Pp. xi + 218. (London: Whittaker and Co., 1901.) Price 3*s.* 6*d.*

MR. T. E. HERBERT describes the book before us as a practical handbook, and, from certain expressions used in the second chapter, he seems to be one of those practicians who have not overmuch sympathy with theoretical workers. It is not perhaps to be wondered at, therefore, if the preliminary chapters of his book, dealing with the fundamental principles of sound, electricity, magnetism, and telephony are handled in a very unsatisfactory manner. We are afraid that a reader, if he has not already acquired a thorough knowledge of the subject, will be liable to form erroneous impressions. Thus, to give one example, Mr. Herbert states that in an induction coil "the E.M.F.'s generated in the secondary coil are directly proportional to the current variations in the primary." Again, the description of the action of the Bell transmitter is, we are inclined to think, incorrect, as the same mistake is made here of not properly allowing for the time taken over a vibration of the diaphragm.

The greater part of the book is devoted to a detailed consideration of the apparatus and connections used by the Post Office. This would have been greatly improved if more care had been taken with the diagrams. It is a great pity that in a book of this kind, where clearness in the illustrations is so important, the lettering should be in some cases so small as to be unreadable. It is to be regretted, too, that such words as "nextly" and "inoxidible" are allowed places in the text. In spite of the defects, some of which we have tried to point out above, we have no doubt the book may prove useful to telephone engineers who are anxious to be helped over some of their practical difficulties, and are not particular about a clear understanding of the groundwork of their science.

Maps: their Uses and Construction. A Short Popular Treatise on the Advantages and Defects of Maps on Various Projections, followed by an Outline of the Principles involved in their Construction. By G. James Morrison, Memb. Inst.C.E., F.R.G.S. Pp. viii + 110. (London: Edward Stanford, 1901.) Price 5*s.* net.

A BOOK in English on map projections has long been needed, and the present work is a very welcome attempt to meet this need. It may be commended to all who have to deal with geographical questions, and to teachers of mathemathics and practical geometry who wish to find fresh exercises for their pupils.

The volume consists of an introduction, a popular account of eight common projections, followed by another

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chapter dealing with the same projections in a slightly more advanced manner, and concluding with a discussion of projections of small areas. The popular description is exceedingly lucid, and the style is everywhere clear. The main defects of the book are that it is not sufficiently systematic, its nomenclature is occasionally at fault, the practical constructions in some cases are not the simplest, and the drawing of the diagrams is somewhat careless, so that statements in the text cannot always be verified on the figures. For Lambert's equivalent azimuthal projection, the author says there is no special name, and he calls Lambert's equivalent cylindrical projection simply the cylindrical projection. He omits Bonne's projection and both the Sanson-Flamsteed and Mollweide (Babinet's), all of which should receive some notice even in a popular work.

He rightly insists on the value of gnomonic projections for seamen, and of equivalent projections in our atlases; and desires the production of cheap and simplified globes.

A. J. H.

Smokeless Powder, Nitro-cellulose and Theory of the Cellulose Molecule. By John B. Bernadou, Lieut. U.S.N. Pp. viii + 200. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1901.) Price dollars 2·50.

THIS small work is of an entirely different character to the usual text-books on explosives, the author confining himself mainly to a theoretical consideration of his subject. To all interested in the manufacture or use of modern explosives the book should be of interest, throwing as it does much light on the theory of nitro-cellulose and mixtures containing this body, such as cordite or powders containing metallic nitrates with nitro-cellulose.

The book is divided into two parts, there being four appendices occupying considerably over half the volume. This latter portion is of most interest, for the author has collected together translations of the admirable papers by (1) Vieille, "Researches on the Nitration of Cotton"; (2) Mendeléef, "Pyrocollodion Smokeless Powder"; (3) Bruley, "The Nitration of Cotton" (an extension of Vieille's work). Appendix iv. consists of an abstract of a lecture by the author on the development of smokeless powder.

In the early pages concise definitions and a list of synonyms are given for the various substances dealt with, which avoids much confusion.

Some interesting work is recorded on the behaviour of guncotton at low temperatures. With liquid air it was found to be "not only not an explosive, but practically a non-combustible; while non-nitrated cotton under similar conditions is a violent explosive."

The remarkable action of very low temperatures in effecting solution of nitro-celluloses is dealt with at some length. McNab and others have shown that an insoluble nitro-cellulose becomes soluble in ether-alcohol at $-50°$, and the author shows that these bodies are soluble in ethyl ether under the influence of intense cold, and with the exception of the highly nitrated insoluble variety, they are soluble in absolute alcohol under similar conditions.

Lieut. Bernadou, in the latter part of the book, advances an ingenious theory of progressive impulses in guns when firing nitro-cellulose-nitro-glycerin charges, or colloided nitro-cellulose with metallic nitrates incorporated. With cordite, for example, "conditions point to there being two intervals in the decomposition of the charge, during one of which a maximum quantity of nitro-glycerin, and, during another, a maximum quantity of nitro-cellulose is burning." Finally, there may be a third impulse due to combination of the gaseous products. This latter appears to obtain confirmation from McNab and Ristori's analyses of the products from the materials separately and cordite (*Proc.* Roy. Soc., lvi. p. 8.)

In the space of a short review it is impossible to deal in a satisfactory manner with the author's theory of the cellulose molecule, many points being open to debate. The author's formulæ show four OH groups in the unit molecule $C_6H_{10}O_5$, which necessitates the assumption that on nitration some of these groups are unattached, whereas if the molecule is considered as having only three OH groups the limit of nitration is easily accounted for. Again, we are asked to assume that at low temperatures ethyl alcohol "under strain" has the composition usually associated with methyl ether, and that colloidisation is brought about by half molecules of ether or alcohol (under strain!) combining with half molecules of the nitro-cellulose.

J. S. S. B.

Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History). Vol. i. By E. W. Oates. Pp. xxiii + 252. Illustrated. (London: Printed for the Trustees, 1901.)

WE have received from the Trustees a copy of this carefully compiled and beautifully illustrated volume, which reflects the greatest credit on all concerned in its production, and should prove invaluable to all ornithologists and egg-collectors. As a matter of fact, it is somewhat more than is indicated by its title, for the exquisitely coloured plates illustrate the chief types of egg form and coloration characteristic of the various groups of birds, so that it forms to a great extent a manual of "oology." We do not on the present occasion propose to review the volume in detail, reserving this till the work is completed. It may be mentioned, however, that the work is practically unique of its kind, the only other catalogue of eggs published by the Museum having been issued so far back as 1852, and treating only of British birds.

The Trustees have been well advised in securing the services of Mr. Oates, whose previous experience rendered him peculiarly qualified to undertake this important task. Of late years, owing largely to generous donors, the collection of eggs in the Museum has increased by "leaps and bounds," and is probably quite unrivalled elsewhere. At the present time it includes more than 50,000 specimens; but even this vast number, according to the author, represents only about one-third of the known species of birds. An interesting feature of the volume is the account of the growth of the collection, which forms a large part of the introduction.

With the bare statement that it includes the eggs of the ostrich-like birds, the tinamus, game-birds, hemipodes, sandgrouse, pigeons, rails, grebes, divers, penguins, petrels, auks, and gulls, we take leave, for the present, of a most valuable and instructive volume.

R. L.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Colours of Guillemots' Eggs.

YOUR reviewer, in dealing with Mr. R. J. Ussher's work on the birds of Ireland (see NATURE, November 29, 1900, pp. 101 and 102), had his attention particularly drawn to two statements concerning the eggs of the guillemot. In the first of these, which occurs on p. 364 of his book, Mr. Ussher puts forward the suggestion that "the beautiful varieties of colouring must help each bird to distinguish her egg from others lying near *until they all become stained and soiled*" (the italics are mine). This is certainly a very pretty hypothesis; but is not the earlier part contradicted by the part I have italicised? It is certainly indirectly contradicted by a statement on p. 365, where Mr. Ussher records his belief that when the eggs of the guillemot are found, as they sometimes are, in the nests of cormorants and kittiwakes, "the owners of the nest incubate the mixed clutches, and not the

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